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The Use of Lumber Species not Recognized by the Residential Code

Code: 2018 NC Residential Building Code **Date:** June 28, 2021
Section: R502.1.1; R502.3, R502.5, R802.4, R802.5

Note: This interpretation is currently fluid until more complete information is available.

Question:

Can lumber of wood species that is not recognized by the code be used?

Answer:

Yes, if the following is applied.

Due to the shortage of framing lumber, wood species, other than those listed in the North Carolina Building Codes, have appeared in lumberyards throughout the state. Some of these species are not among the wood species currently recognized in the North Carolina Building codes for structural applications.

The primary concern are the specific gravity or wood density, which affects the performance of fastening devices, such as nails, screws, or gusset plates and the allowable stresses, which affect the span. A lower specific gravity may result in a decreased resistance capacity of a framing connection, or reduced capacity to resist wind and seismic loads of a braced wall panel. A lower allowable stress will result in shorter span.

Most of the lumber meets or exceeds the specific gravity value of 0.42 (the lowest value among the four species recognized by the code) except for the following species:

Table #1 Species with Specific Gravity less than 0.42

SPECIES	GRADE STAMP NOMENCLATURE	Specific Gravity
ALASKA SPRUCE	AK SPR	0.41
ASPEN	ASPEN	0.39
COTTONWOOD	COT	0.41
EASTERN HEMLOCK-BALSAM FIR	E HEM B FIR	0.36
EASTERN HEMLOCK-TAMARACK	E HEM-TAM	0.41
EASTERN SOFTWOODS	EASTERN SOFTWOODS	0.36
EASTRN WHITE PINE	EW PINE (N)	0.36

NORTHERN SPECIES	N. SPECIES	0.35
NOTHERN WHITE CEDAR	NW CEDAR	0.31
NORWAY SPRUCE ROMANIA & UKRAINE	N SPR (I) ROM; UKR	0.38
NORWAY SPRUCE (NORTH)	N.SPR	0.4
REDWOOD	REDWOOD	0.37
SPRUCE-PINE-FIR (SOUTH)	SPF(S)	0.36
WESTERN CEDAR	WC	0.36
WESTERN WOODS	WW	0.36

For example, if the stamp shows the wood species that contain N SPR ROM UKR (see the grade stamp in Photo #1), the specific gravity is 0.38. The lumber will not meet the prescriptive fastening and braced wall panel requirements and will automatically require an engineered design. Without engineering, the material should be disqualified for use in a structural application.

Element of a Grade Stamp

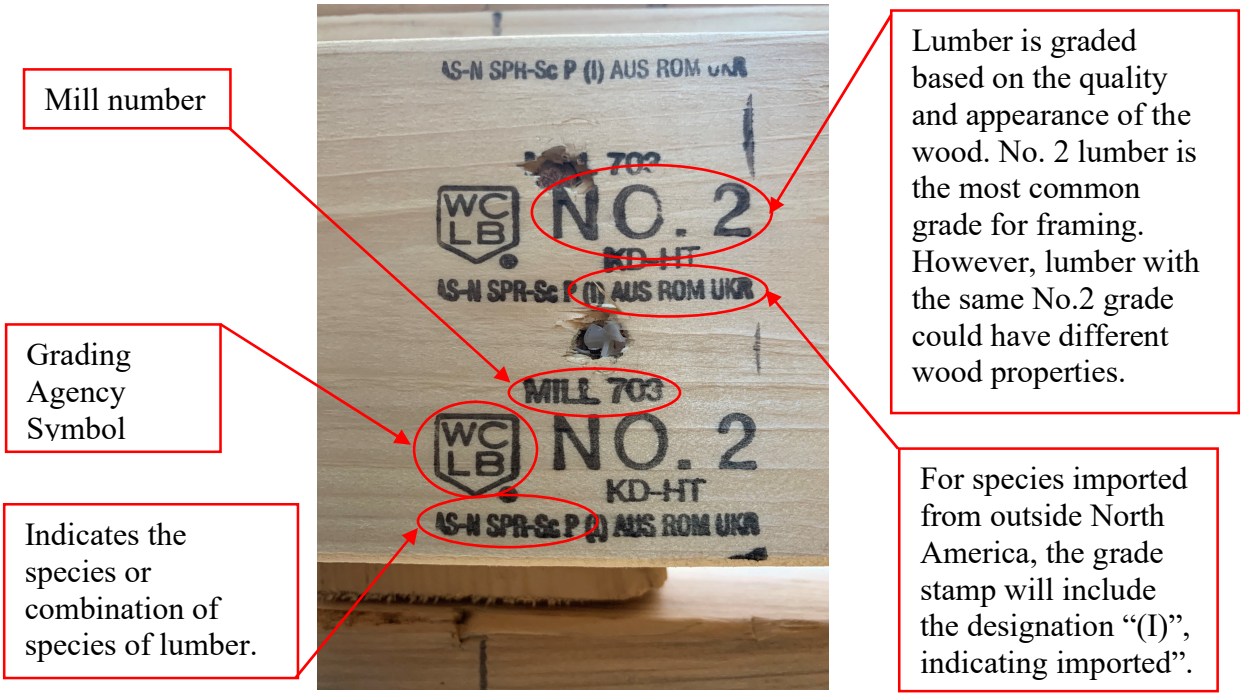

Photo #1 Lumber Grade Stamp

Question:

How to determine the allowable span of joists or rafter for a species not recognized by the code?

Answer:

According to NCRC Section R502.3, R802.4, and R802.5, the allowable joist span and spans for rafters shall be determined from the *Span Tables for Joists and Rafters* (STJR) published by American Wood Council when other grades, species or loading conditions are used that are not provided in the building codes.
The AWC STJR span tables shall be used with the published design values for the specific species desired to be used to determine its allowable span. Published design values shall be obtained from AWC's *Design Values for Joists and Rafter.*

Link to *Span Tables for Joists and Rafters (STJR)* Published by American Wood Council

https://awc.org/pdf/codes-standards/publications/span-tables/AWC-SpanTables2015-1505.pdf

Link to *Design Values for Joists and Rafters* published by American Wood Council

https://awc.org/pdf/codes-standards/publications/span-tables/AWC-SpanTables2015-DVJR-1505.pdf

Design values for Non-North American Visually Graded Dimension Lumber

https://awc.org/docs/default-source/default-document-library/addendum--6-22-21.pdf?sfvrsn=758c06bc_4

Example:

What is the code allowable span for this European 2x10 joist spaced 16 inches on center?

Design Criteria:
10 psf Dead Load
40 psf Live Load (Table R301.5)
Live Load Deflection limit = L/360 (Table R301.7)

From AWC *Design Values for Joists and Rafters:*

	Bending F_b	**Compression perpendicular to grain F_c**	**Modulus of Elasticity E**	**Special Gravity**	**Allowable Span**
Austrian Spruce No.2 from Austria (AS)	1170	260	1500000	0.43	15'-9"
Scots Pine No. 2 from Austria (ScP)	980	270	1400000	0.5	14'-5"
Combined Design Values	980	260	1400000	0.43	**14'-5"**

Answer:

When a combination species/species group nomenclature is shown in a grade stamp, the user of the lumber would select the weakest species/species group shown on the grade stamp as the appropriate value for the specific allowable property.

The allowable floor joist span for this European species 2x10 at 16 inches on center spacing = 14'-5"

Question:

How to determine the allowable span of a girder or header that is fabricated by using a species of lumber that is not recognized by the code?

Answer:

For European species, the allowable spans for header and girders shall be determined from tables listed in *Technical Report #7* developed by Pacific Lumber Inspection Bureau (PLIB), This technical report provides span tables for girders and headers as well as design criteria for jack studs for European species for use with the prescriptive code for European Species.

Link to *Technical Report #7 Span Tables for Headers and Girders for European Species* by PLIB

https://www.plib.org/staging/wp-content/uploads/2021/06/PLIB-Technical-Report-No-7.pdf

At this point, engineered design is required for headers and girders that are fabricated from lumbers other than the four species recognized by the code and the European Species covered in *Technical Report #7*.